SRI International

(Sensei) Technical Report: Distribution A

Sensei: A Multi-Modal Framework for Assessing Stress Resiliency

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Sensei (SRI #P21103)

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1 *Update: Technical Progress and Accomplishments for Period 15 (March 2013):*

Task 3.1: Capture Behavioral Stress Markers in Real-Time in Lab Environment with graded exposure to ICT's scenarios MAC 1-6

During this reporting period, we collected pilot data verifying that our stressful and relaxing tasks were having the desired effects on subjects. Figure 1 below shows some typical measurements from the Equivital GSR module for two different subjects. In each of these plots, the green shaded areas indicate those times during the experiment within which the relaxing Carribean beach video was being shown to the subject, while the red shaded areas indicate the time during which the subject was engaged in the Stroop + peripheral detection task, with increasing task difficulty as time moves on (to the right).

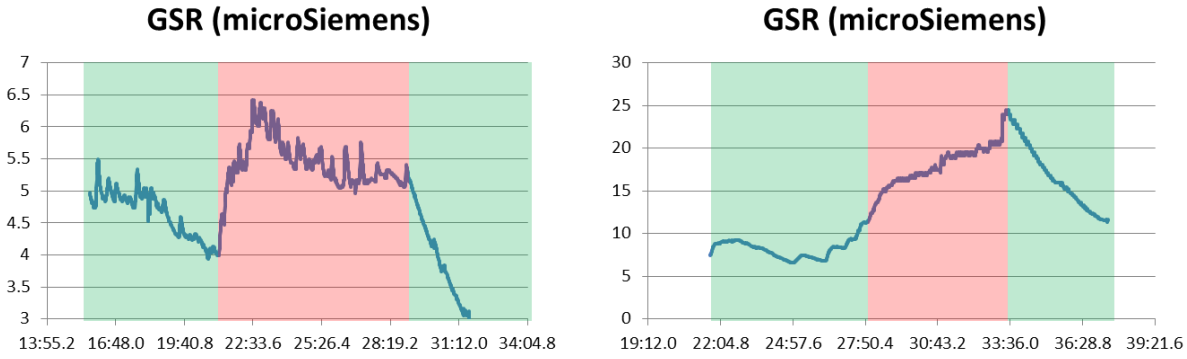

Figure 1. Typical GSR responses for two different subjects. Green areas show relaxation phases of the experiment; red shows stressful test phase. Subject in plot on left is female; plot on right, male.

Report Documentation Page

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As these plots indicate, subjects appear to have strong reactions to the different experimental periods. Moreover, differences between subjects also show some interesting patterns. For example, in the subject on the left, a strong GSR response at the start of the Stroop test was followed by equilibration towards the end, while for the subject on the right, the GSR response increased throughout the task. Also of interest for the second subject is the upturn in the GSR response before the start of the Stroop test, possibly indicating some anticipatory stress.

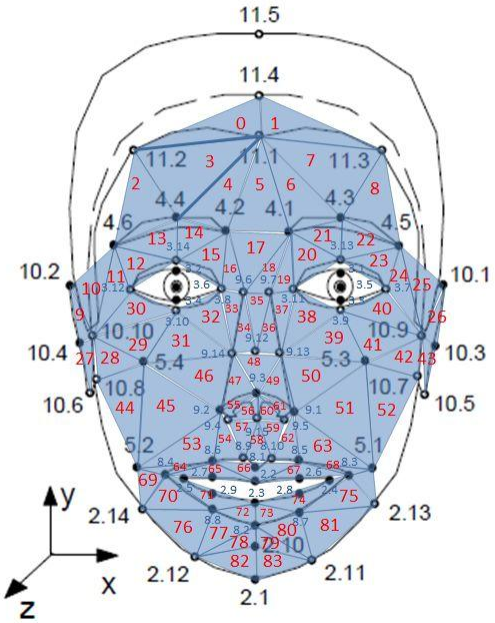

Figure 2. Facial region mapping for thermal measures

To assess the sensitivity of facial thermal measures to these changes in subject state between the experimental phases, we have also implemented during this period a facial region mapping for use in collecting local thermal averages, as shown in Figure 2. This mapping is based on the MPEG-4 FBA standard, but connects triples of points from this standard to tile the face in triangles, within each of which a local thermal average is being computed during facial feature tracking. FBA location numbers are shown in blue, our own region numbering in red. So for example, the breathing response shown in the last monthly report is based on the thermal averages in regions numbered 56 and 60. We have successfully tested the thermal average computation within these tracked regions and will be using it for all subsequent data collection.

During this period, we also made a relatively simple but useful change in the experimental paradigm, to assist in subsequent analyses. In this change, we are now running the complete set of Stroop/PDT trials twice, with the exact same speed up in tempo over the course of the task, and the only difference being that the first time

through, all Stroop trials are consistent (color word and its font color are the same) while during the second set, they are inconsistent on random trials, for stress maximization. We implemented this change so that we could control for subject motion (e.g. during responses to each trial), while manipulating stress level.

Also during this reporting period, we modified, resubmitted, and were approved by our IRB for the experimental protocols going forward. We anticipate running approximately 12 subjects under this new protocol during this current reporting month.

Task 3.2: Administer Scenarios and Verify Hypothesis **MAC 6-12**

Not yet at this stage.

Task 3.3: Program Management **MAC 1-12**

2. Issues:

- No current issues.

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